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A DISCOVERY OF GEM GARNET IN NEW YORK CITY

JAMES G. MANCHESTER AND GILMAN S. STANTON

New York City

The mica schist and gneiss of Manhattan Island, New York City, as well as the accompanying granite veins, contain many garnets. Some may be found at almost any point, while in parts of the city, notably the region of Mount Morris Park and the south shore of Spuyten Duyvil Creek—the extreme northerly shore line of Manhattan Island—they are thickly disseminated thruout the schist, but all are fractured, semi-translucent and poorly colored, and rarely show a crystal face.

In the granite or pegmatite veins better crystals occur, some of large size, associated at times with tourmaline, and more rarely with beryl. The most notable specimen for size and perfection of crystal form is one found at Thirty-fifth Street and Broadway and now the property of Dr. George F. Kunz.¹ The crystal is free from matrix, weighs nine pounds ten ounces, and is probably the finest large garnet crystal yet found in the United States. A fragment of a somewhat larger crystal of similar form to the Kunz garnet was taken out of the rock by Charles W. McDonald at Broadway and One hundred and sixty-fifth Street. This specimen, with only a few of the crystal faces developed, weighs ten pounds eight ounces, including a small amount of the matrix which is attached.

Single crystals three or four inches in diameter are occasionally found, being mostly modified trapezohedrons. (See Fig. 2). Several of these are included in the New York Mineralogical Club collection in the American Museum of Natural History. The locality that has furnished the greatest number of finely crystalized garnets is Sixty-fifth Street just east of Broadway, discovered by one of us (G. S. S.) in 1888.² Hundreds of fine dodecahedrons with trapezohedral truncations, mostly from three-eighths to one inch in diameter, were collected here from a coarse pegmatite vein. (See Fig. 3). The garnets usually occurred at the juncture of the quartz and orthoclase, and were flattened when imbedded in the latter.

¹ *Trans. N. Y. Acad. Sci.*, 5, 265, May 31, 1886. See Fig. 1, Frontispiece.

² *Trans. N. Y. Acad. Sci.*, 10, 50, Jan. 5, 1891; "Geology of the City of New York," L. P. Gratacap, p. 135.

The garnets of the city have been considered to be mostly almandite, altho essonite has been reported as occurring at Tenth (Amsterdam) Avenue and One hundred and thirty-fifth Street and at Fort George, and grossularite is listed, without locality, as from the city. In view of the following facts, analysis might show some to be spessartite or andradite.

In October, 1916, one of us (J. G. M.) discovered a new collecting locality which held out good prospects. During the erection of apartment buildings in the block bounded by Haven and Northern Avenues and West One Hundred and Seventy-eighth and West One Hundred Seventy-ninth Streets, in the Washington Heights section of the city, a large amount of rock was taken out. The material was the usual gneiss and contained many veins of mica, quartz and feldspar, of varying composition. The writers in examining the material found a number of garnet crystals, one a four inch distorted trapezohedron, and the others smaller, poorly defined crystals, of the usual local type. There was also found embedded in a granite vein a half-crystal about three inches in diameter and it was readily seen to be of gem quality and somewhat different from the garnet crystals usually found in the Manhattan rocks. Unfortunately this gem half-crystal could only be removed in fragments, but, the fractures being somewhat parallel to each other, material suitable for cutting purposes was obtained. At first the mineral was thought to be almandite, but a specimen, submitted to Dr. W. T. Schaller, was found by him to contain large amounts of aluminium and manganese, with only very small amounts of iron, calcium and magnesium, indicating it to be spessartite. The latter is indeed suggested by the color of the cut stones, which might however, be mistaken for essonite.

The rough material was cut by the Espositer, Varni Co. and pronounced by them to be of fine gem quality and of an unusual color. Upon direct comparison with specimens of the Amelia Court House spessartite in the Morgan Gem Collection at the American Museum of Natural History the New York stones proved to be more brilliant, more perfect, more translucent and of a more beautiful color, being a clear, slightly orange red, rather than the cloudy brownish red of most of the Amelia Court House stones.

In all 39 brilliant and step-cut stones have been cut. Their combined weight is about 19 carats, the largest weighing 1.37 carats.

Among the many garnets found in New York City rocks, some of them remarkable as crystals, none have heretofore been found of gem quality. That this crystal should cut into gems of more than usual beauty was unexpected, and the find is an important addition to the gem stones already listed as native to Manhattan Island.

THE PROBABLE IDENTITY OF URANOTHALLITE AND LIEBIGITE.¹

ESPER S. LARSEN

U. S. Geological Survey

The available descriptions of uranothallite and liebigite indicate them to be very similar, except in chemical composition. Three fairly satisfactory analyses of uranothallite are available and the composition must be near $2\text{CaO} \cdot \text{UO}_3 \cdot 3\text{CO}_2 \cdot 10\text{H}_2\text{O}$. The only published analysis of liebigite was made in duplicate on 85 and 65 mg of the mineral and appears to lead to a different formula, $\text{CaO} \cdot \text{UO}_3 \cdot 2\text{CO}_2 \cdot 20\text{H}_2\text{O}$.

An optical study made by the author shows, however, that either the two minerals are identical, or many of the specimens supposed to be liebigite are merely uranothallite. Three specimens labeled liebigite² and two labeled uranothallite³ have the following characteristic optical properties:

Optically+, $2E = 65^\circ \pm 3^\circ$, $2V = 42^\circ \pm 2^\circ$. Dispersion $\rho > v$ easily perceptible. Nearly colorless in section and with a cleavage normal to X. $\alpha = 1.500 \pm 0.003$; $\beta = 1.503 \pm 0.003$; $\gamma = 1.537 \pm 0.003$.

The author has been unable to get any of the original liebigite; a very small grain would be sufficient to determine the optical properties. However, it is at least certain that much so-called liebigite is uranothallite, and it is not unlikely that the original analysis of liebigite, made on so small an amount of material, is in error, and that liebigite is identical with uranothallite. Altho the name liebigite has priority, it is recommended that the name *uranothallite* be retained for the mineral since the first accurate description was published under this name. Its composition may be accepted as $2\text{CaO} \cdot \text{UO}_2 \cdot 3\text{CO}_2 \cdot 10\text{H}_2\text{O}$, and liebigite should not be given the rank of a species unless it is shown to be distinct by further study.

For the specimens on which this study was based the author is indebted to Dr. Wherry and the United States National Museum, Mr. Gratacap and the American Museum of Natural History, Professor Ford and Yale University, and Colonel Roebling.

¹ Published with permission of the Director of the U. S. Geological Survey.

² Two from Schneeberg, Saxony (U. S. Nat. Mus. Cat. No. 45643, and Yale Univ. Brush Coll., No. 2995) and one from Joachimsthal, Bohemia (Am. Mus. Nat. Hist., N. Y.)

³ Both from Joachimsthal, Bohemia; one U. S. Nat. Mus. Cat. No. 52057 and the other in Colonel Roebling's collection.

DIAMOND-BEARING GRAVEL FROM BELGIAN CONGO

M. G. EDWARDS

University of California

In the spring of 1916, Mr. F. M. Rapp, mining engineer, now at Tonopah, Nevada, returned from the Belgian Congo, Central Africa, where he has been engaged for two years in geological work along the Kasai River and its tributaries. He brought back with him a carefully collected sample of fine gravels from the present stream beds in which the Kasai diamonds occur. Mr. Rapp turned this sample over to the writer with the request that he determine its mineral composition. The results, while of no far-reaching significance, may be of some interest as a matter of record and as affording a means of comparison with the mineral composition of the diamond concentrates from similar deposits in other parts of the world.

Mr. Rapp's exploration covered a distance of 250 miles along the Tshikapa, Longatchimo and Tshipumbu rivers, all tributaries flowing northward into the Kasai River which ultimately joins the Congo River. This area includes the Kasai diamond region, one of the three districts within the boundaries of the Belgian Congo where diamonds are known to occur. The district is of fairly large extent and promises to be, according to Ball, of greater commercial importance than either the Katanga or the north-eastern districts. Mr. Rapp believes that the approximate abundance of the various mineral constituents in the gravel is represented by their relative abundance in the sample as indicated in the following list:

Amethyst, rare	Garnet, common
Beryl, fairly common	Black variety
Chalcedony, rare	Red variety, in part pyrope
Chromite, common	Ilmenite, fairly common
Chrysoberyl, fairly common	Limonite, pseudomorph after pyrite, rare
Variety cymophane present	Magnetite, common
Corundum, rare	Mica, in schist pebbles
Sapphire of poor quality present	Opal, rare
Cyanite, abundant	Pyrite, rare
Diamond, rare	Quartz, fairly common
Colorless and dark crystals present	Rutile, common
Epidote, abundant	Specular hematite, common
Feldspar, common	Staurolite, common
Orthoclase	Tourmaline, abundant
Plagioclase	Zircon, common

The mineral aggregate has the texture of coarse sand, the individual grains varying from the size of the head of a pin to that of a pea. The prevailing color is black, on account of the abundance and greater size of the ferro-magnesian minerals.

The grains are predominantly well rounded but show in some instances a tendency toward elongation in certain crystallographic directions. Minerals which retain sufficient crystal form

to aid in their identification are: quartz, epidote, zircon, staurolite and diamond.

Striations due either to twinning or to oscillatory combination are preserved on quartz, epidote, plagioclase, specular hematite, rutile and diamond. Cleavage and parting, induced by the grinding action of the gravels, are conspicuous on cyanite, epidote, orthoclase, plagioclase, specular hematite, rutile and diamond.

Some of the red garnets are pyrope resembling the "Cape ruby" of the diamond diggings of South Africa. Topaz, which has been reported in the diamond-bearing gravels of Rhodesia and Brazil, and xenotime and monazite, reported from Brazil, were not observed.

An article published a few years ago by Ball and Shaler¹ on the economic geology of the Belgian Congo describes the Kasai diamond fields. In this interesting paper, which represents a pioneer summary of the knowledge of the mineral resources of the Belgian Congo, some of the minerals enumerated above are mentioned. To this paper and to an earlier one by Ball² the reader is referred for a description of the underlying geology and the occurrence of the diamond bearing gravels.

¹ Ball, S. H. and Shaler, M. K., *Econ. Geol.* 9, 605, 1914.

² Ball, S. H., *Eng. Min. J.*, Feb. 3, 1912, p. 268.

TERMINATED CRYSTALS OF THAUMASITE.¹

EDGAR T. WHERRY

U. S. National Museum

The U. S. National Museum recently received from Mr. James G. Manchester a lot of minute thaumasite crystals, found loose in a cavity in the trap rock at West Paterson, N. J. Five of them have been found to be terminated by good pyramidal faces, so that a redetermination of the axial ratio of the mineral has been possible. Dr. W. T. Schaller had previously reported this to be $c = 1.09$, on the basis of a very rough measurement on a single crystal from the same locality.² Full details of the new results will be published in the Proceedings of the National Museum in a few months, but the following preliminary data seem worth placing on record at this time:

THAUMASITE

Hexagonal (hemimorphic?). $\epsilon_p = 47^\circ 05'$. $c = 0.931$

Forms:

base	c	0001
second order prism	a (new)	1120
first order prism	m	10 $\bar{1}$ 0
first order pyramids:	e (new)	10 $\bar{1}$ 2
	f (new)	2023
	p	10 $\bar{1}$ 1
	q (new)	3032

¹ Published with permission of the Secretary of the Smithsonian Institution.

² *Bull. U. S. Geol. Survey*, 610, 130, 1916.

CRYSTALS OF WATER

FREDERICK A. CANFIELD

Dover, N. J.

Few substances receive greater attention and more careful treatment than water, but, as a mineral, none gets less consideration. In one of its common forms it is massive and crystalline, and often, when in the form of snow, it shows highly complex groupings. Judging from the paucity of the literature about water, simple crystals have scarcely ever been observed, and yet they may be produced as easily as crystals of alum.

Some years ago the writer had a hydrant which was supplied with water thru a three-quarter inch lead pipe. The pipe was buried under three feet of earth. Near the hydrant was a valve by which the water could be shut off below the frost line. Access to this valve was thru a pit eight inches square, with walls of brick laid in cement. The brickwork extended about five inches above the surface of the ground, so that the valve was about three and one half feet below the top of the brickwork. The pit was covered with an iron casting, in which was a hole for the valve wrench. These details are given to assist in reproducing the physical conditions, if anyone cares to make the experiment.

One day, when the temperature was below zero (F.), the writer noticed that the inner surface of the bricks, at the top of the pit, was covered with a white coating of frost, which had the general appearance of some specimens of natrolite. An examination, with a low power hand glass, revealed a multitude of crystals of ice. The crystals were not measured, but quoting from memory, they were about 0.5 mm. thick and 3 mm. long. Each crystal was distinct and independent, and while they were densely clustered there was no indication of a hexagonal or stellate grouping.

The crystals were hexagonal prisms, with well formed angles, and dull, opaque sides or planes. The terminations were complete, with three planes, which, instead of being elevated, as in rhombohedrons, were just the reverse—they were all depressed—as tho they had sunken into the body of the prism. No reason can be offered for this peculiarity. It has been suggested that it could have been the result of trilling. A somewhat similar condition has been observed in certain crystals of calcite. The terminal planes were also dull and opaque. The roughness of the surfaces of the crystals may have been due to the accession of fine particles of ice, which were attracted by the growing crystal.

These crystals were undoubtedly produced by the freezing of the moisture which rose from the damp earth in the bottom of the pit.

AVENTURINE LABRADORITE FROM CALIFORNIA

OLAF ANDERSEN

Geophysical Laboratory, Washington, D. C.

In the course of the writer's work on aventurine feldspars¹ many specimens in the collection of the U. S. National Museum were studied. One of these, comprising a number of pebbles and 6 cut stones, from Modoc County, California, (Cat. No. 87268-9) proved to be so different from the majority of the specimens that it was not described in the paper above cited.

Being practically colorless and transparent, except for the inclusions which yield the red aventurine effect, the identity of the feldspar seemed worth establishing by optical and crystallographic measurements, and the results are presented in table 1:

TABLE 1

Properties	Measurements	Inferred Composition
Extinction angle on P(001)	-11°	Ab ₃₅ An ₆₅
Extinction angle on M(010)	-23°	Ab ₃₆ An ₆₄
Mean refractive index, β	1.565 (approx).	Ab ₃₅ An ₆₅
Refractive index of the glass obtained by fusing the mineral n_{Na}	1.543 ± 0.002	Ab ₃₃ An ₆₇
Angle P \wedge M (001 \wedge 010). computed from angle 001 \wedge 001 between twinning lamellas (albite law)	94° 30' ± 20°	{ Plagioclase near anorthite

The mineral is therefore a labradorite approaching bytownite.

The aventurine inclusions are very small, roughly 0.01-0.03 mm. in diameter, and less than 0.001 mm. in thickness. They are sometimes translucent with a greenish color, but mostly opaque and showing characteristic copper-red color in reflected light. They are oriented parallel to P (001) and M (010). In order to confirm the inference that these inclusions might be, not hematite as is the case in most aventurine feldspars, but metallic copper, a sample of the mineral was submitted to Dr. E. T. Allen, who found on analysis that traces of copper are actually present.

This feldspar is thus unusual in owing its aventurine character to inclusions of metallic copper.

¹ *Am. J. Sci.* [4] **40**, 351-399, 1915.

CLAYTON PEAK, UTAH: ONE OF NATURE'S
STOREHOUSES OF MINERALS

V. W. FIELD

Salt Lake City, Utah

Clayton Peak, one of the highest summits of the western crest of the Wasatch range, is midway between Park City, one of the famous silver-lead camps of the country, and Alta, another mining camp, situated at the head of Little Cottonwood Canyon.

The Peak is composed of quartz-diorite, and the contact minerals adjacent to this mass are very interesting to the mineralogist. The writer has had occasion to visit these points twice in the last two years, once going by way of Park City, which is about six miles northeast of the peak, and the other time by the Cottonwood route, via Alta. On both trips minerals were collected from the limestones on the north and south sides, and also from the quartzites on the east in the vicinity of Park City, and in the underground workings of both camps.

The minerals collected were quartz, jamesonite, massicotite, sphalerite, pyrolusite, cerussite, calcite, garnet, epidote, chabazite, muscovite, galena, pyrite, specularite (hematite), etc. Those taken from the mines show, as a rule, well formed crystals, while those found at or near the surface are weathered.

In one of the mines the following minerals were found: a fine aggregate of galena crystals, very brilliant and highly modified; crystals of sphalerite and galena intergrown, on aggregates of quartz crystals; large and well formed crystals of pyrite, both single and grouped, one measuring about four inches across the faces. One group of pyrite crystals was taken from a cavity which was lined with bunches of acicular crystals of jamesonite; these hair-like crystals were so intergrown with the pyrite crystals that the latter were colored dark. The jamesonite has a dark steel-gray color and a brilliant metallic luster.

Cerussite is a common ore of the district and is sometimes found well crystallized, mostly in crevices in galena. It is also found in the form of slender acicular crystals up to two inches in length, and greenish white in color.

In the mines of Alta are found a variety of crystallized minerals: wulfenite, in thin tabular yellow crystals associated with the other lead ores, and in fine crystals on calamine. One large specimen taken out showed fine crystals intergrown with quartz crystals. Calamine occurs in the form of needle-like crystals lining the cavities in pyrolusite, and in botryoidal masses surrounding the wulfenite crystals. Small and almost transparent crystals of sphalerite were collected at one mine, and the writer has had the pleasure of seeing several beautiful specimens of aurichalcite. Some large pyrite cubes altered to limonite were found associated

with quartz crystals, the crystals being perfect, but looking as tho they had been twisted and mashed.

The district is noted for having produced large and well developed crystals of quartz, both single and grouped. One large group, taken out by the writer was studded with small brilliant pyritohedral crystals of pyrite.

The eastern part of the district yields large numbers of loose crystals found on the surface, some almost as brilliant as the "Herkimers." On the north side of the mountain, in an outcrop of limestone near the diorite, garnet is very abundant. Dodecahedral crystals of brown and green garnet implanted on calcite, associated with specularite (micaceous hematite) occur, and fine showy specimens were obtained. Good specimens of chabazite, epidote, muscovite, and a yellow garnet were taken from the southern contact. Further north and west coarse porphyritic granite appears, and here fine crystals of orthoclase, some twinned (Carlsbad law) were taken out of the rock.

The following minerals were reported from the locality, but were not observed by the writer: diopside, monticellite, ludwigite, phlogopite, magnetite, chalcocite, tetrahedrite, fluorite and pyromorphite.

The district is very favorable for collecting, interesting specimens being obtainable at any time. The country is not only noted for its variety of minerals and rocks, but also for some of the finest scenery in the West. To the south of Clayton Peak Big Cottonwood Canyon forms a large amphitheatre which is covered with timber, and built up with summer homes. Silver Lake lies at its base, while on the opposite side of the peak, but higher up, the beautiful Lackawaxen Lake is situated, making it an ideal spot to spend a summer vacation.

AN ELEMENTARY INTRODUCTION TO CRYSTALLOGRAPHY

J. P. WINTRINGHAM

Brooklyn, N. Y.

(Continued from page 83)

The face 110 is referred to as the unit prism and the face 111 as the unit pyramid. As already indicated they, with the pinacoids, are the most important faces, for they will give the constants of the crystal, the angles between the axes, (thus far all right angles) and the lengths of the axes, (thus far all equal).

We have now described the three most important fundamental crystal forms; four other primary forms are derived from them, and all other isometric crystals are combinations of these seven. Every plane or face of a crystal we have described has cut one or

more of the axes, and in every case where a plane has cut an axis it has been only and entirely at its outer end.

The next four forms cut the axes at some other point than the ends (or the center, where the axes cross).

This is indicated by symbols larger than 1, such as 2. The figured 2 indicates that the axis is cut equally in two, and that the plane cuts the axis at the halfway point. 3 or a larger figure would indicate that the axis was cut into that many parts, and that the plane cuts the axis at the dividing point nearest the center.

Let us take the form indicated by the symbol (210); it is called the four-faced-cube. Each face of the cube has on it a pyramid made by four planes, each bounded by one edge of the square face and by two lines extending from two corners to the center.

210 and $\bar{2}\bar{1}0$ would be the two such faces on the front face of the cube that would be parallel to c . These would cut the a axis half way from the center and b at its ends.

They would not be as flat as the faces of the cube nor as steep as the faces of the dodecahedron. The symbols of these last, 100 and 110, may be multiplied by 2 and written 200 and 220, when it is at once seen that 210, the symbol for a face of the four-faced-cube, has a slant midway between them.

This suggests the second great law of crystallography—that the planes which cut one axis divide it into parts, which, for the different planes, bear simple numerical relations, as twice, three times, a half, a third, two thirds, (2 to 3), three halves, (3 to 2), etc.

All the angles in a zone, if measured not in degrees but in "offsets," as elevations, or as tangents, bear simple ratios or relations to each other (in other words, they are commensurable). This is called the rationality of the indexes, and is the second fundamental law of crystallography.

Each of the four faces of the cube parallel to c has two pyramid faces also parallel to c , making eight faces in the c zone.

I think it is plain that there are also eight independent faces in each of the zones a and b ; in all, twenty-four faces. It would be good practice for a student to write down the symbols of the eight faces in each of these zones, thinking them out. For the c zone

on 100	on 010	on $\bar{1}00$	on $0\bar{1}0$
$2\bar{1}0$, 210	120, $\bar{1}20$	$\bar{2}10$, $\bar{2}\bar{1}0$	$\bar{1}\bar{2}0$, 120

It is plain that this could be done with very little thinking, indeed, mechanically. On 100 and on $\bar{1}00$ the symbols are the same, except that for faces that are opposite one another the signs are all reversed. To reverse the signs always indicates a face directly opposite a given face.

The faces in the c zone, the symbols of which always have 0 in the third place, are called prism faces, except when they are the faces of a cube or pinacoid.

(To be continued)

PROCEEDINGS OF SOCIETIES

NEW YORK MINERALOGICAL CLUB

The annual meeting of the Club was held on Wednesday, May 9th, 1917, in its room at the American Museum of Natural History, Mr. James G. Manchester presiding, with an attendance of 23 persons, 17 being members.

The election was postponed until after the papers and exhibits of the evening were presented. The announced paper was by Mr. Samuel G. Gordon on "A Paragenetic Classification of Minerals" consisting largely of a review of a recent paper on the subject by the Speaker and Dr. Edgar T. Wherry jointly.¹

The paper was illustrated with a series of lantern slides of the various classes and of some of the minerals occurring in each of the chief classes proposed.

Upon the conclusion of Mr. Gordon's paper Mr. J. P. Winttingham commented upon it and stated that in his opinion it was an important contribution to the literature of mineralogy. As no further discussion of the paper followed, the President asked for exhibits of specimens, and Mr. Gordon then exhibited a mass of selenite occluding a selenite pseudomorph, supposed to be after anhydrite, and coated on its faces with small quartz crystals, from West Paterson, N. J.²

Mr. David J. Atkins then exhibited a couple of specimens of spodumene from California which were originally the familiar pink variety, but had been changed to a hiddenite green of equal intensity by rays from a special form of x-ray tube, by Mr. H. Rosenthal of the Rosenthal Laboratory, Camden, N. J. Mr. Atkins said he understood that other minerals containing manganese were susceptible to change of color by the same rays. This exhibit greatly interested those present.³

The mineralogical events having been thus concluded the President appointed a nominating committee, announced a recess to enable it to consult and report, and for the inspection of the exhibits by visitors; in a brief address he thanked the Club for the compliment of his several re-elections, and expressed a desire to resign the Presidency on account of urgent business exactions. During the recess the visitors, not interested in the election, withdrew.

Upon resumption of the session, the report of the nominating committee was unanimously approved, and resulted in the re-election of the former officers with three substitutions, as follows:

George F. Kunz, Ph.D., Pres.; George E. Ashby, V-Pres.; Gilman S. Stanton, Treas.; Louis P. Gratacap, James G. Manchester, and Frederick I. Allen, Curators; and W. G. Levison, Secy. and Delegate to the academy council.

WALLACE GOULD LEVISON, *Secretary*.

¹ *Proc. Acad. Nat. Sci. Phila.*, 1915, 426-457

² Figured in *Am. Min.*, 1, (5), Frontispiece, 1916.

³ See abstract in this number.

THE PHILADELPHIA MINERALOGICAL SOCIETY

Wagner Free Institute of Science, May 10, 1917.

Mr. Trudell in the chair. Twelve members and four visitors present. Mr. William L. Fischer, of the Commercial Museum, Philadelphia, lectured on "Minerals and Ores of the Andes," illustrated with lantern slides and numerous specimens.

The secretary reported the trip to General Trimbles mine, attended by seven members. This mine has long been abandoned. The pit is filled with water, and the dumps afford a small amount of gibbsite. Small druses of wavellite were found by the party, but thoro search failed to reveal any ceruleolactite. The graphite mines at Chester Springs (formerly Yellow Springs) were also visited.

SAMUEL G. GORDON, *Secretary*.

THE MINERALOGICAL SOCIETY OF GREAT BRITAIN

London, March 20, 1917, Mr. W. Barlow, President, in the chair.

A. HOLMES and DR. H. F. HARWOOD: *The basaltic rocks of Spitsbergen and Franz-Joseph Land.* J. W. EVANS: *A general proof of the limitation of the symmetry-numbers of crystals.* E. S. FEDEROV: *The numerical relation between zones and faces of a polyhedron.* The numerical relation shown by axes of symmetry situated in planes of symmetry pointed out by G. Cesaro in 1915 is only a particular case of the more general one deduced by the author in 1885. A. LEDOUX, T. L. WALKER, and A. C. WHEATLEY: *The crystallization of parahopeite.* Crystals in the Royal Ontario Museum of Mineralogy from the original locality, Broken Hill, Northwestern Rhodesia, are triclinic with the axial ratios $a : b : c = 0.7729 : 1 : 0.7124$; $\alpha = 93^\circ 22'$, $\beta = 91^\circ 12'$, $\gamma = 91^\circ 22'$. Thirty-two forms are recorded. The crystals have a perfect cleavage parallel to the brachypinacoid, and show lamellar cleavage parallel to the macropinacoid. The angle of optical extinction on the cleavage is 10° with reference to the twin-lamellae. *Nature*, **99** (2474) 97-98, 1917.

ABSTRACTS OF MINERALOGICAL LITERATURE

HALLOYSITE FROM COLORADO. ESPER S. LARSEN, U. S. Geological Survey, and EDGAR T. WHERRY, U. S. National Museum. *J. Wash. Acad. Sci.* **7** (7) 178-180, 1917.

Analyses of two halloysites from the upper workings of the fluorite mine at Wagon Wheel Gap, Colorado, associated with creedite and gearsutite, respectively, were found to differ in their water content. Experiment showed the water to be held in part mechanically, being given off very readily, the resulting partially dehydrated material being near kaolinite.

"The close approach of this and many other analyses of halloysite to the composition $\text{Al}_2\text{O}_3 \cdot 2\text{SiO}_2 \cdot 2\text{H}_2\text{O}$. Ag, combined with the results of optical examination . . . , indicates that the material called halloysite is the amorphous (isotropic) mineral corresponding to crystalline kaolinite, holding thru capillarity or adsorption more or less excess water." S. G. G.

NEODYMIUM AS THE CAUSE OF THE RED-VIOLET COLOR IN CERTAIN MINERALS. EDGAR T. WHERRY, U. S. National Museum. *J. Wash. Acad. Sci.* **7** (6) 143-146, 1917.

Examination of red-violet calcite from Joplin, Mo., Rossie, N. Y., and Sterlingbush, N. Y. showed them all to yield the characteristic absorption spectrum of the rare-earth metal neodymium and it is believed that the red-violet color is due to this element. Evidence is brought forward to show that manganese, to which there is a tendency to attribute all such colors, cannot be the coloring agent in these calcites. Violet apatite does not usually show an absorption spectrum, but the well-known brown variety from Ontario, Canada, and red-violet material from the San Diego Mine, Mesa Grande, Cal. yield that of neodymium. In the former case the violet color is obscured by a green, due to iron. S. G. G.

ON THE CALCIUM-PHOSPHATE IN METEORIC STONES. GEORGE P. MERRILL, U. S. Nat. Mus. *Am. J. Sci.*, [4] **43** (4) 322-324, 1917.

Unmistakable evidence of the presence of a calcium phosphate, tentatively designated francolite, has been found in 16 meteoric stones. This material differs from normal apatite in its optical and physical characteristics: "Occurrence, sporadic, without crystal form, very brittle, colorless; cleavage for the most part lacking tho sometimes imperfect and interrupted, showing angles of 60° and 120° ; optically biaxial and positive (?), birefringence weak, less than 0.005, refractive indices $\alpha = 1.623 \pm 0.002$ and $\gamma = 1.627 \pm 0.005$; no

pleochroism and often undulatory extinction, polarizing in light and dark colors, sometimes almost isotropic; easily soluble in cold dilute nitric acid and less so in hydrochloric, giving solutions reacting for Ca and P; it is a product of the last stages of consolidation." S. G. G.

GEMS AND PRECIOUS STONES IN 1915. WALDEMAR T. SCHALLER, U. S. Geol. Survey, *Min. Res. U. S.*, **1915**, (2) 29, 843-858.

A statistical review of the production of gems in the United States in 1915. S. G. G.

USEFUL MINERALS OF THE UNITED STATES. FRANK C. SCHRADER, RALPH W. STONE, and SAMUEL SANFORD. U. S. Geological Survey *Bulletin* **624**, 412 pp. 1917.

This bulletin gives concisely the location, by states and counties, of the principal deposits of useful minerals, and includes a glossary showing the composition and character of each mineral and the location of its principal deposits. It gives also the principal uses of each mineral.

S. G. G.

A DESCRIPTIVE CATALOGUE OF THE METEORITES COMPRISED IN THE COLLECTION OF THE GEOLOGICAL SURVEY OF INDIA, CALCUTTA (ON AUGUST 1st, 1914). J. COGGIN BROWN. *Memoirs Geol. Survey India*, **43** (2) 149-287.

THE GENESIS OF PLEOCHROIC HALOES. J. JOLY, Univ. of Dublin. *Phil. Trans. Royal Soc. London*, **217** (A, 551), 51-79, 1917.

A NEW FIND OF METEORIC STONES NEAR PLAINVIEW, HALE COUNTY, TEXAS. GEORGE P. MERRILL. *Proc. U. S. Nat. Mus.*, **52**, 419-422, 1917.

MINERALOGICAL NOTES, IV. THE IDENTITY OF BLACK RUTILE AND STRUEVERITE. WILLIAM P. HEADDEN. *Proc. Colo. Sci. Soc.*, **11**, 177-183, 1917.

NOTES ON RARE MINERAL OCCURRENCES. RICHARD C. HILLS. *Proc. Colo. Sci. Soc.*, **11**, 203-208, 1917.

Comprises notes on: Galena with octahedral cleavage; Gold in limonite; Gold in barite; Gold with enargite; Gold in calcite; Native silver in selenite.

S. G. G.

A STUDY OF THE MAGMATIC SULFID ORES. C. F. TOLMAN, JR. and AUSTIN F. ROGERS. Stanford University, Cal. *Publication*, 1916; 76 pp., 7 text figs., 20 plates. [Price \$1.00.]

Comprises a discussion of the bearing of magmatic differentiation on ore segregation, and a description of the various deposits of the magmatic ores. From a microscopic study of opaque sections the authors conclude that "..... the magmatic ores in general have been introduced at a late magmatic stage as a result of mineralizers, and that the ore-minerals replace the silicates." S. G. G.

CRYSTALS OF PYROMORPHITE. EARL V. SHANNON, Yale University. *Am. J. Sci.*, [4] 43 (4) 325-327, 1917.

Crystals of pyromorphite were found occurring in the deeper levels in the Caledonia mine, Coeur d'Alene District, Idaho, in unaltered galena. Color: colorless, faintly pink to deep grayish violet; luster: adamantine in the smaller crystals and resinous in the larger opaque ones. The forms noted are: x (1011), and m (1010), the larger crystals having curved prism faces and brush-like terminations. V, Ca, and As were found to be absent.

Examination of crystals from Broken Hill, N. S. W. showed the following dominant forms: a (1120), s (1121), m (1010) with a small base and occasional first order pyramid. S. G. G.

CONTRIBUTIONS FROM THE DEPARTMENTAL LABORATORY. J. C. H. MINGAYE. *Records Geol. Survey N. S. W.* 9, (3), 127-173, 1916.

Includes analyses and notes on: The chemical composition of some zeolites from Prospect quarry, near Parramatta; Chlorite, from Nundle, a remarkable variety of gem quality; Autunite from Carcoar; Beryl from Torrington; Chenevixite from the Ardlethan Tin Fields; Notes on the composition of the Delegate meteorite; Notes on the Molong meteorite; Notes on Gilgoi meteorite, No. 7, Brewarrina, N. S. W.; Analyses of Obsidianites from the Uralla District and Charlotte Waters; Notes on chillagite.

S. G. G.

NEW PROCESS OF COLORING GLASS BY SHORT WAVE LENGTHS OF LIGHT. H. ROSENTHAL. Read before the N. Y. Section of the Am. Chem. Soc., June, 8th 1917. (See report of meeting of N. Y. M. C. of May 9th, 1917, on p. 95).

"The glass is colored by radiations derived from a 'special x-ray tube' about 4 inches in diameter having an anode of solid tungsten supported on a rod of molybdenum, and a cathode consisting of a tungsten spiral which is electrically heated. Unless the filament is heated the tube shows no conduction in either direction and is self rectifying with an alternating current because it suppresses any current in the direction which does not make the hot filament the cathode. In order to make this condition stable the anode is water-cooled and the bulb cooled by compressed air. It is operated by a high-tension transformer.

The penetration of the emitted rays could be varied by the voltage applied and the current by the temperature of the cathode spiral.

Under the rays from this tube several kinds of optical glass become colored of various yellow to brown tints progressively thruout, and one assumed to contain manganese acquired an amethystine or purple tint.

Some semi-precious stones can be decoloredly changed in color by these rays. The pink California spodumene can be changed in a few minutes to an emerald-green.¹ Other minerals colored by manganese respond to this form of energy.²

W. G. L.

¹ In specimens of the spodumene thus changed in color seen by the reviewer the green tint appeared to be of no greater intensity than the original pink or lilac, and of hiddenite rather than emerald tint.

² No specimens of minerals other than spodumene illustrating these statements have been seen by the reviewer.

EXCHANGE NOTICES

Morton L. Jandorf; York, Pa. Carnotite, Colorado; metaheawettite, Utah. Frederick Oidach; 2008 N. Mervine St., Philadelphia. Fine actinolite from Lafayette, Pa.